ISSN (Print): 0972-2467
ISSN (Online): 0976-2477
SRELS Journal of Information Management, Vol 53(1), February 2016, p. DOI:

Multimedia Technologies and Student Learning : A Case Study of G.S. ST Michel EPA

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Abstract

Information overload experienced in the information society calls for improved human information processing.Researchers around the globe are now focusing research on investigating the contributions of multimedia technologies on information processing. This research seeks to bring out the contributions of PowerPoint presentation on content recall, interpersonal interaction and attitudes towards PowerPoint presentation in communication. This research was conducted on the senior one (S1) secondary school students of GSS EPA, in Nyarugenge district, Kigali city province, Rwanda. A sample size of 180 students was selected based on Slovin's formula from a population of 330 senior one students. Through a completely randomized experimental pretest-posttest design, the sample size was randomly assigned to three groups: The group one (G1) is the control group while group two (G2) and group three (G3) experimental groups. Students in group one (G1) were exposed to only talk-and-chalk (less interactive communication strategy) while those in group two (G2) were exposed to talk-and-chalk with PowerPoint presentation and finally students in group three (G3) were exposed only to PowerPoint presentations (a more interactive communication strategy). The researchers used questionnaires, observations and test questions to collect and analyze the data collected in order to establish the relationship between multimedia and student learning attitude.

Keywords: Attitude, Interaction, Information Processing, Learning, Multimedia, Multimedia Technologies, PowerPoint Presentations, Recall, Talk-and-Chalk

1. Introduction

Interactivity of information has been greatly investigated and a considerable measure of empirical evidence exists to support the effects of interactive information on an individual's cognitive information process[13]. In the education sector, interactive learning involves actively and directly engaging students in what they are learning inlistening and talking to other students, writing, reading in addition to reflecting[1].

Based on information processing theories such as constructivist and cognitive theories of learning, multimedia (combining audio and visual elements of information) models for instruction have been developed with the aim of improving learning and information processing even in education sector[29]. The argument for multimedia use in learning is that if well used, it can address multiple learning styles of students, engages both auditory and visual senses, and provides rich cognitive resources for understanding and processing information[8,29]. In addition, multimedia can cultivates student's interest, promotes their interpersonal communication skills for group discussion, and improve teaching and communication effectiveness[44]. However, there has been a contradiction across different subject fields, researchers have found interactivity of a content to either cause a positive effect, no effect or a negative effect on individual's memory[5,9,15].

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In spite the confusion, multimedia technologies such as PowerPoint presentations are increasingly being deployed in education environments[11] with attempts to better communication and supplement traditional (talk-and-chalk) teaching methods. Researchers have argued that if well used, multimedia technologies such as PowerPoint technologies will improve students' information recall, interaction during processes and promote positive attitude towards information presentation style[27].

2. Multimedia Information Processing in Human Mind

Attempts to explain how the human mind processes multimedia information has led to several theories such as the dual coding theory by Paivio suggesting that compatible modalities like text and images are processes in parallel in the working memory to produce a strong encoding of processed information, and increase retrieval of such information compared to when a single media such as text or image only is used[34]. This theory was improved by Mayer to elaborate how humans learn from multimedia and designed the cognitive theory of multimedia learning. It explains that the working memory has limited capacity and upon it information entering from two separate but interrelated channels is processed[26,29]. One channel is concerned with verbal (audio) and another with nonverbal (visual) parts of the information. Information processing begins by selecting relevant parts, organizing it into respective audio or visual models and creating a relational link with the constructs in the long-term memory for storage as knowledge[29]. The theory further suggests that more information is processed when audio and the visual parts are simultaneously presented than when a single channel is used[35].The prober utilization of the limited capacity of the working memory is essential for effective information processing and according to Cooper (1998)[17]; abstract words consume more memory and are difficult to process as compared to pictures. Other scholars support empirically that pictures enhance recall[7,17] and when paired with words, additive effects on memory such as, deep processing, distinctive encoding and contextual support to the material are provided by the pictures[43]. Moreover the argument that multimedia for instruction actively engages learners with the content by researchers has led to innovation of incorporating technologies such as PowerPoint and to the increased use in classroom learning environments[4,12,41,42].

3. Contribution of PowerPoint Presentation on Information Recall

PowerPoint presentations has been used to simultaneously integrate multimedia materials such as animation, video clips, photos, and sound into lesson presentations[12] and observable results such as improved encoding (storage) and retrieval of information noticed[27]. According to Clark and Paivio (1991)[16], PowerPoint presentations break the content of a message into a hierarchy of topics and outlines, include visual and auditory materials that supplement the presentation session and enhance mental images to facilitate comprehension and retrieval of information during quizzes and examinations[16,27]. Although other studies have found no effect or a negative effect on content recall by PowerPoint presentations[9,22,29,40,42], argue that like any other multimedia, PowerPoint presentations may or may not influence learning therefore teachers are advised to apply it within the proven principles of multimedia learning[20,29,37].

An outcome based research compared three conditions; overhead lecture, PowerPoint lecture and PowerPoint presentation with notes. The study reported high student grades in both PowerPoint conditions as compared to the overhead lecture[42]. Likewise, a slide-show-supplemented lecture group outperformed the traditional lecture group using dry eraser board. The difference was explained as resulting from the learning environment created in the slid –show- supplemented class as compared to the traditional one[25]. Gier and Kreiner (2009)[23] examined the effects of using a content-based questions PowerPoint on learner's performance. Learners were exposed to two study conditions by teaching one group with a content-based questions PowerPoint presentations and the other taught by PowerPoint alone. On analysis of the results, the content-based questions PowerPoint group scored significantly higher than the other group. They concluded that PowerPoint presentations with annotations have the ability to improve learners performance by improving understanding of the content, providing for different learning pace, creates a "more cognitive path to facilitate the construction of referential links and mutual references between the two channels"[26]. A further evidence was found when the basic-PowerPoint (with text only) group recalled and scored 10% better than the expanded PowerPoint (PowerPoint with graphics and sound) group(Bartsch and Cobern, 2006)[6]. In comparison to passive communication styles such as the commonly used talk-and-chalk in classroom communication, 50%

of content learnt is remembered when taught through interactive learning and 10% when taught with talk-and chalk[1]. From this explanation, we hypothesized that:

H_1: PowerPoint presentations significantly improve information recall.

4. Contributions of PowerPoint Presentations on Interpersonal Interaction during Presentations

Multimedia technologies such as PowerPoint presentations have the capabilities of maximizing the ability to retain information and audience engagement[14]. According to Paivio, information processing begins with a creation of nonverbal (imagery) representations of the material encountered in the message, building a language and a referential connection upon this image and incorporating a natural syntax into the imagery[35]. As function words are required and used, inter-verbal connections are expanded[21], till abstract verbal skills are established that the individual uses the language perfectly even in the absence of the material[35]. The influence of PowerPoint presentations on classroom interaction has mixed findings such as, significantly effecting, no significant effect, hampering interaction[24,30] and reducing classroom spontaneity[31].

Aimed at incorporating active learning with PowerPoint-based lectures using content-based questions (CBQ). In all the two experimental study, they were able to observe high classroom interaction when content-based-questions where incorporated in PowerPoint presentations (Gier and Kreiner, 2009). When students in an introductory behavioral statistics course were assessed on their perception about PowerPoint use in the lecture, they indicated that PowerPoint presentations helped them understand the course material for the midterm exams though at the final exam, the traditional lecture was instead credited for augmenting actual classroom interaction between student-to-student and student-to-lecturer[33]. According to DenBeste (2003)[19], the effectiveness of PowerPoint presentations on performance and interaction can be enhanced by (1) beginning class sessions with relevant images displayed on screen to stimulate students toward interactivity in classroom, and (2) asking questions based on the image[19]. Such images are helpful in supporting textual explanations or descriptions[11].From this explanation, we hypothesized that:

H_2: PowerPoint presentations significantly promote interpersonal interaction during presentations.

5. Attitude of Audience Towards PowerPoint

Scholars propose that it is always significant to assess levels of satisfaction with regard to the use of multimedia in communication[2]. Multimedia effects have been labeled as motivating, improving self-esteem levels, and enabling creative and directed thinking[32]. Some studies have concluded that if well used, PowerPoint presentations can result to a high level of satisfaction in audience[36]. A study that measures pattern and attitude of instructors and their expectations for the outcome of television and Video use reveals a steady rise in their use over 20 to 30 years[10]. The study shows a two-third of instructors reported that their students learnt more when multimedia such as Video was used and about 70% noticed motivational levels rising in their students. A similar report (CPB, 2004)[18] observes that these media use in classrooms has significant effect such as, reinforcement of lecture material, enhancing comprehension and discussion, catering for multiple learning styles and increasing student motivation and enthusiasm. However, studies have shown mixed findings about the use of multimedia and power of PowerPoint presentations[3,38]. PowerPoint presentations have been marked as boring and even hindering learning because it is passive while others have found it producing positive student attitude[5], and students perceiving the lectures as more interesting than traditional lectures[5].

An empirical investigation on students perceived novelty and effectiveness by Burke and James (2008)[12] showed that business students who with high novelty perceived PowerPoint based lectures as favorably influencing their note taking, recall of content during examinations, and capturing their attention during the lesson as compared to those with low novelty[12]. The students in the high novelty also reported a more positive attitude towards PowerPoint lectures and the lecturer. From this explanation, we hypothesized that:

H_3: PowerPoint presentations significantly promotes positive attitude towards the information presentation style.

6. Research Design and Methodology

6.1 Research Design

This study used the Senior One (S1) students of GSS EPA as the research population. The S1 students were chosen because they were the only ones available by the time of data collection.From the student population of 330

students, 180 students were chosen as respondentsusing slovin's formula[39] to participate in the study as the sample size with a confidence level of 95% assumed. Using the same random number table, 60 students were randomly assigned to each group, Group One (G1), Group Two (G2) and Group Three (G3) respectively.

The first group (G1) is the control group while group 2(G2) and group 3 (G3) experimental groups. G1 was exposed to only talk-and-chalk while G2 were exposed to both talk-and-chalk with PowerPoint presentation and finally G3 were exposed only to PowerPoint presentations as represented in Table 1.

Table 1. Study Design

Random Sampling and assignment	Group	Experiment design			
		Pretest (O_1)	Treatments	Posttest (O_2)	Questionnaire (Q)
	G1	O_1	TC	O_2	
	G2	O_1	TC PT	O_2	Q
	G3	O_1	PT	O_2	Q

TC = Talk-and-chalk PT= PowerPoint Presentation

The design is a modification of the cognitive-based framework for evaluating multimedia systems (Magenheim & Scheel, 2004[28]).

6.2 Pretest and Posttest

The pretest involved the measure of content recall by exposing all the sampled students to open ended questions on Atmospheric Pressure in order to assess their attitude towards the subject. The results were collected and analyzed. After three days, the posttest was given to the respondents. To minimize the effect of a teacher on internal validity, all groups were taught by the same teacher using the same content, lesson plan and at the same time.Group treatment:G1 were taught using talk-and-chalk and any diagrams required for teaching drawn on the chalk board. G2 were taught first by talk-and-chalk as G1 then they attended a second session where the same material was taught again using PowerPoint presentations containing colored pictures, photographs, texts and narrated animations with the aid of a projector, laptop, and loudspeaker. G3 were taught using PowerPoint presentations only and therefore they were not exposed to talk-and-chalk. G2 and G3 were given a questionnaire to respond to questions that evaluate the attitude of the students towards the lesson and subject.

6.3 Data Collection Procedures and Instruments

To assess audience attitude towards PowerPoint presentation, an attitude pre-questionnaire was given to the experimental groups three days before the experiment to assess their attitude toward Physics as a subject and the method of presentation used. After the experiment, a student questionnaire was given to assess the change in attitude: specifically, interest level, understandability and finally motivation towards the lesson were examined.

7. Data Analysis Methods

7.1 Validity and Reliability

Both internal and external validity of this study was maximized by using the completely randomized design to control threats arising from extraneous variables. The topic of study was selected and tests were designed from the school S1 syllabus so that the lesson and evaluation are relevant to the learners. Further, three physics teachers will be given to analyze the questions and correct any mistakes.Two observers were deployed in the classrooms to rate the classroom session using observation rating scale. Their level of agreement will be calculated to assess reliability of their observation. The rating scale was first analyzed by lecturers and other teachers in Physics. Finally, the multimedia used will be designed or selected using the criteria outlined by Ludwig et al., (2004)[27], Mayer and Moreno (2002)[29].

8. Results

8.1 Contribution of PowerPoint on Recall of Content

When investigating the contribution of PowerPoint presentations on improving information processing, the improvement in the respondents' ability to recall presented information was assessed. The results of the pretest are summarized as shown in Table 2.

Table 2. Pretest results

Group	Mean	SD	95% Confidence Interval for Mean		Min	Max
			Lower Bound	Upper Bound		
G3	1.3333	5.03098	.0337	2.6330	.00	20.00
G2	1.0000	4.39568	-.1355	2.1355	.00	20.00
G1	1.6667	5.57436	.2267	3.1067	.00	20.00
Total	1.3333	5.00279	0.5975	2.0692	.00	20.00

Source: Primary data (2013)

It can be observed that the average mean is 1.33 with a standard deviation of 5.0 was realized across the groups. Specifically, Group one (G1) obtained a mean

score of 1.67, group two (G2) obtained a mean score of 1.0 and group three (G3) obtained a mean score of 1.33 as indicated in Table 2. The standard deviation of Group one (G1) and group three (G3) was the highest though both their means were greater than for group two (G2). This implied that a few members of both Group one (G1) and group three (G3) had little more knowledge of the topic while in group two (G2) the knowledge was somewhat uniform as compared to the other groups.

Table 3 shows a one way ANOVA result of the pretest. It can be observed that the there is no significant difference among the mean of the groups (F (2,177) =0.264, p=0.768, i.e. p>0.05) hence the groups had little knowledge of the topic of atmospheric pressure.

Table 3. ANOVA Results for Pretest

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	13.333	2	6.667	.264	.768
Within Groups		4466.667	177	25.235		
Total		4480.000	179			

Source: Primary data (2013)

Table 4 shows the results of the posttest. It can be observed that the respondents scored a mean of 48.6 with a standard deviation of 32.2 which means the students scored averagely in the physics subject. The minimum mark was 0.0% and the maximum mark was 100%. It is evident that learning took place between pretest and posttest sessions. Group two (G2) scored a mean of 77.5, followed by group one (G1) with 35.67 and lastly group three (G3) with 32.67. The standard Deviations were so high for all the groups however in group three (G3) it was highest with 30.25 indicating that the individual abilities revealed in the last term scores in physics still remained constant even in the posttest. Minimum mark was 0.00% in group one (G1) and group three (G3) and 30.0% for group two (G2) and a Maximum mark of 100% was obtained by all the groups.

The analysis of variance showed that the groups improved in their scores between pretest and posttest (F= 60.77, P=0.000) however group two (G2) greatly improved with a mean twice as high as that of group one (G1) and group three (G3) implying that their information processing greatly improved and therefore learning took place as summarized in Table 5.

Table 5. ANOVA for Posttest

			F	Sig.
Between Groups	(Combined)		60.774	.000
	Linear Term	Contrast	.435	.510
		Deviation	121.112	.000

Source: Primary data (2013)

The results were analyzed using the independent sample t-test as summarized in Table 6. The results show that that there is no significant difference in the

Table 4. The posttest Results

Group	N	Mean	SD	95% Confidence Interval for Mean		Min	Max
				Lower Bound	Upper Bound		
G3	60	32.6667	30.24570	24.8534	40.4800	.00	100.00
G2	60	77.5000	16.01112	73.3639	81.6361	30.00	100.00
G1	60	35.6667	26.25602	28.8840	42.4493	.00	100.00
Total	180	48.6111	32.16167	43.8807	53.3415	.00	100.00

Source: Primary data (2013)

Table 6. Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
Posttest marks	0.09	0.764	-0.58	118	0.563	-13.2	7.2
retention	0.967	0.327	-1.344	118	0.182	-19.4	3.7
Posttest transfer	13.36	0	2.057	118	0.042	0.4	19.6

Source: Primary data (2013)

mean scores of group one (G1) and group three (G3) with p<0.563. This implies that participants who were instructed by Talk-and-Chalk did not perform any better than those instructed by PowerPoint presentations alone.

8.2 H2 Tests the Contributions of PowerPoint Presentations in Promoting the Interpersonal Interaction

The study further asked the respondents to indicate their opinions about various statements reflecting interaction levels. All items were evaluated on a Likert-type scale with 1 = Strongly Disagree and 5 = Strongly Agree with Neutral = 3. Table 7 shows a summary of the response and analysis of variances within the groups. The respondents were asked if the diagrams helped them understand so as to explain to the group members. Both Group three (G3) andgroup two (G2) strongly agreed with a mean of 4.43 revealing p<0.258. Three questions were phrased different to assess the attitude towards group discussion after the presentation. The questions were: (1) we should always do group discussions (2) I enjoy learning in a group (3) I like to participate in class and my group. Both groups agreed at varying levels to the first and second questions, group three (G3) strongly agreed with a mean of 4.25 while group two (G2) agreed with mean of 3.60. Group three (G3) strongly agreed with a mean of 4.33 and group two (G2) remained neutral with a mean of 3.02. Both Groups agreed on the third question with a mean 3.48 for group three (G3) and 3.72 for group two (G2). Group two (G2) having had two style and explanations of the same content, did not comprehend the value of the discussion groups while group three (G3) that had only PowerPoint presentation appreciated the role of Group discussions in consolidating facts they watched and listened to.

After attending the presentation, both groups agreed that they had gained enough knowledge to explain to anyone in their own words group three (G3) had a mean (4.10) and group two (G2) had a mean (4.07), p<0.872. It is likely that the method of presentation to group three (G3) empowered them though it did not give them enough information as compared to the methodology used for group two (G2). PowerPoint presentation did influence interaction of the participants though at various

Table 7. Influence of PowerPoint Presentation on Interaction of participants

	Item	N	Mean	SD	F	Sig.
	The diagrams helped me understand and explain to the group members				1.294	.258
G3		60	4.43	.927		
G2		60	4.23	.998		
	We should always do group discussions				10.55	.002
G3		60	4.25	.856		
G2		60	3.60	1.29		
	I feared to discuss in my group because I didn't Understand				32.51	.000
G3		60	2.97	1.46		
G2		60	1.75	.773		
	I enjoy learning in a group				51.00	.000
G3		60	4.33	.914		
G2		60	3.02	1.09		
	I like to participate in class and my group				1.153	.285
G3		60	3.48	1.40		
G2		60	3.72	.922		
	Did you like answering these questions				7.098	.009
G3		60	4.33	1.13		
G2		60	4.75	.437		
	I can now explain to anyone what I have learnt in my own words				.026	.872
G3		60	4.10	.933		
G2		60	4.07	1.30		
	Only one person was explaining all the time in our group				12.70	.001
G3		60	3.15	1.44		
G2		60	2.27	1.26		

Source: Primary data (2013)

levels and created a longing for group discussions in the group three (G3) audiences than it did for group two (G2) audiences.

8.3 The Observer's Findings

Table 8 shows that for group three (G3) and group two (G2), the two observers agreed that there was interaction though in group three (G3) there was less interaction as compared to group two (G2).

Table 8. Observer's agreement

	Mean	Standard Deviation
G3	3.333	1.632
G2	4.533	1.68466

Source: Primary data (2013)

8.4 H3 Tests the Student Perception towards the use of PowerPoint Presentations in the Classroom Learning

The attitude of the audience towards PowerPoint presentation was assessed by Likert-type scale where by 1 = strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree. The analysis for pre-questionnaire revealed that the respondents had a negative attitude towards the presentation style used and after the experiment; the attitude change was significant as revealed by several p-values of the items. The respondent's comments suggested that they liked the presentation especially the pictures and the convenience it introduces in presentations as compared to the usual talk and chalk they were used to.

The collected data from the pre-questionnaire was coded by dividing the scale into two portions. The study collapsed the likert scale in a manner that Rating of 1and 2 were equated to Negative attitude while 4 and 5 were equated to Positive attitude 3 remained as was neutral. The means of each portion were computed as indicated in Table 9. The results shows that group two (G2) had a mean of 4.367 toward negative attitude higher than the 4.218 on the positive while group three (G3) had mean 4.7667 towards Negative higher than 4.583 towards the positive. The means indicate that the respondents of both groups had a negative attitude toward Physics as revealed by $p<0.443$. This contradicts the study that was conducted on the students in Table 4 which showed that the students' performance ability in physics is above average.

The attitude of the students was further analyzed after the experiment and analyzed using ANOVA as summarized in Table 10. All items were assessed using a Likert-type scale where by 1 = strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree. The collected data from the pre-questionnaire was coded by dividing the scale into two portions. The study collapsed the likert scale in a manner that Rating of 1and 2 were equated to Negative attitude while 4 and 5 were equated to Positive attitude 3 remained as was neutral. A number of questions were rated and the question "I enjoyed the lesson" scored a mean of 3.84 in group three (G3) and 4.49 for group two (G2). The means were all above the Neutral value implying agreement and the $p>0.005$ showed that group three (G3) agreed less as compared to group two (G2). With an$F=12.0$, $p=0.001$, G3 was more bored than group two (G2) though both scored means in the range of disagreement with the question that the lesson was boring. Interestingly, group three (G3) found the lesson easier to follow than group two (G2) probably because group two (G2) tried to compare the Talk and chalk session while group three (G3) had nothing to compare with. Both groups acknowledged that the PowerPoint Presentation lesson challenged them to think and was presented in a manner that helped them to learn. There was a diversion on level of agreement that the pictures in the presentation were confusing with $p>0.000$. Group two (G2) strongly Disagreed with a mean of 1.74 while group three (G3) were closer to the Neutral value with a mean of 2.98. This could have been due to the fact that group two (G2) had got prior explanation to the diagrams while group three (G3) had not. Both groups disagreed that they got tired however their levels of disagreement varied when they were asked whether they understood the content. In this respect, group three (G3) was closer to Neutral though disagreed while group two (G2) strongly disagreed that they didn't understand. The combined styles used to present the content might have helped group two (G2) over G3. Finally both group two (G2) and group three (G3) agreed that the presentation was clear. PowerPoint

Table 9. Attitude levels of Respondents before experiment

	N	G2		G3					
Attitude		Mean	SD	Mean	SD	df	MS	F	Sig.
Negative	60	4.367	4.476	4.7667	4.056	1	10.8	0.592	0.443
						118	18.243		
Positive	60	4.218	4.218	4.583	4.823				

Source: Primary data (2013)

presentation therefore positively influenced the attitudes of the respondents in both groups.

9. Discussions

Based on the study that was conducted on the student's previous score, the sampled population indicated a relatively high performance of physics subject with an overall mean of 63.1667 percent with both the total median and modal score as 62.5 percent for all the groups. However the standard deviation values are so high 16.89 which indicated that the results are deviating too wide from the mean as it is expected in the normal exam as evidenced in Table 3 which corresponded with

Table 10. Influence of PowerPoint on Respondent's attitude

	Item	N	Mean	SD	F	Sig.
	I enjoyed the lesson				8.016	.005
G3		60	3.84	1.385		
G2		60	4.49	1.073		
	The lesson was boring				12.002	.001
G3		60	2.72	1.342		
G2		60	1.92	1.183		
	The lesson was entertaining				6.789	.010
G3		60	3.28	1.354		
G2		60	3.86	1.058		
	The lesson was easy for me to follow				13.497	.000
G3		60	4.10	.969		
G2		60	3.18	1.672		
	The lesson challenged me to think				.169	.682
G3		60	3.60	1.167		
G2		60	3.68	1.049		
	I was not given the chance to ask or share				.017	.896
G3		60	2.37	1.340		
G2		60	2.40	1.452		
	Class time was used well				2.248	.136
G3		60	3.93	1.191		
G2		60	3.62	1.121		
	Were presented in a manner that helped me learn				.370	.544
G3		60	3.72	1.146		
G2		60	3.57	1.425		
	The picture were confusing and difficult to muster				23.071	.000
G3		60	2.98	1.613		
G2		60	1.74	1.049		
	I got tired				.046	.830
G3		60	2.12	1.367		
G2		60	2.07	1.096		
	I didn't understand				15.692	.000
G3		60	2.59	1.261		
G2		60	1.72	1.151		
	The lesson was clear				.359	.550
G3		60	4.23	1.198		
G2		60	4.35	.917		

Source: Primary data (2013)

the students' positive attitude towards physics. However, this did not correspond to the school performance as indicated in (Education, 2013).

According to the study, students who were taught using PowerPoint presentations alone scored a slightly lower mean than the students that were taught using talk-and-chalk alone. $p<0.764$ show that PowerPoint presentations alone does not improve information recall any better than talk and chalk. However, the students who were taught using both the PowerPoint presentations and talk-and-chalk indicated a greater information recall and hence outperformed the other students by a mean score of twice as high as the other mean scores. From this finding it is notable that when PowerPoint presentations are well designed and used as complimentary resources for the oral presentation of information, it greatly improves information processing. This is because the complemented presentation utilizes the diverse learning styles of the audience targeted. For example some of the participants were thrilled by the pictures, while others by the explanations from the teacher.

Compared to the pretest, all groups improved on their test scores after being attending the different presentations. The group that was instructed by Talk and Chalk then by PowerPoint presentation (G2) outperformed all the other groups taught either by talk and chalk or PowerPoint presentation alone. There was no significant difference in test scores between talk and chalk only or PowerPoint only groups. However, the PowerPoint presentation groups G2 and G3 indicated a significant ability to transfer information to the long term memory for applications requiring procedural knowledge while G1 the talk and chalk failed. The independent sample t-test comparing PowerPoint only group and talk- and- chalk only group revealed that the two groups were different after exposure to different treatments.

Looking at this study from the student learning interaction point of view, this study analyzed the interaction of participants in the PowerPoint presentation groups and found that it produced high interaction with participants acknowledging that it helped them discuss in their groups. The findings are similar to those of Burke and James (2008)[12] who found that participants who viewed PowerPoint presentations as a new instruction method, considered it as highly enhancing their session group interaction and a similar result is shown by Gier and Kreiner (2009)[23] that when the Slides contain questions for discussions, PowerPoint presentations significantly increase interaction in the class.

10. Conclusion

In conclusion, PowerPoint presentations and other multimedia communication technologies can improve information processing by improving on the attitude of the targeted audience, increasing interactions during the presentations and providing a better organization of information for long term storage related tasks. Further, this research has found evidence that PowerPoint presentations can complement communication styles that are less active to improve the way the recipients process the information. Information specialists, instructors and communicators should feel confident to incorporate well designed PowerPoint presentations in their messages to achieve better outcomes of the intension of communication especially when the audience is large. Users of PowerPoint presentations must not think that it is to replace them but instead use the slides to complement their presentations to avoid boring the audience.

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